Properties of Light and Electricity

4-5 The student will demonstrate an understanding of the properties of light and electricity. (Physical Science)

4-5.7 Illustrate the path of electric current in series and parallel circuits.
Taxonomy level: 2.2-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have not been introduced to the concept of electricity and types of circuits in previous grades. They will further develop the concepts of circuits as they study electric motors, generators and electromagnets in 6th grade (6-5.3) and the functioning of simple parallel and series circuits in high school Physical Science (PS-6.9).

It is essential for students to know the path of the electric current in electric circuits as follows:

Series circuit

- In a *series circuit*, electric current goes through each device in the circuit in one sequential, complete path from the source of the current.
  - A diagram of a *series circuit* has one path for the electric current to flow through and has symbols for at least one battery, a wire, and one or more devices that change electrical energy to another form of energy for example light (light bulbs).
  - If one light bulb in a series goes out, all the other light bulbs in the circuit go out too because the circuit is no longer complete.

Parallel circuit

- In a *parallel circuit*, however, the current branches into several loops and has more than one path through which the electric current flows.
  - A diagram of a parallel circuit shows more than one path through which the electric current flows and has symbols for at least one battery and several wires in more than one loop, branch, or path. Each path contains at least one device (for example a light bulb) that changes electrical energy to another form of energy.
  - If a light bulb goes out in one of the loops or paths of a parallel circuit, the lights in the other loops stay on because the electric current can flow in more than one path.

It is not essential for students to explain why the brightness of the bulbs gets dimmer as bulbs are added in a series circuit, or why the brightness stays about the same with several bulbs in a parallel circuit. Nor do they have to explain what happens when more batteries are added to series versus parallel circuits.

Assessment Guidelines:
The objective of this indicator is to *illustrate* the path of electric current in series and parallel circuits; therefore, the primary focus of assessment should be to give or use illustrations as examples of series and parallel circuits with models. However, appropriate assessments should also require students to *interpret* a diagram of series and parallel circuits; *compare* examples of series and parallel circuits; *compare* series and parallel circuits; or *recognize* series and parallel circuits.